Nuclear Instruments and Methods in Physics Research B67 (1992) xiii–xix
North-Holland

Contents

Editorial vii
Dedication to Professor Jens Lindhard ix
Conference photograph x
Key to conference photograph xi
Committees and sponsors xii

Section I. Excitation and electronic stopping

Dynamic screening and wake effects on electronic excitation in ion–solid and ion–surface collisions
Burgdörfer, J. 1
Scattering and stopping of swift diatomic molecules under Coulomb explosion
Sigmund, P. 11
Laser effects on proton energy loss in metals
Abril, I., A. Gras-Martí, N.R. Arista and R. Garcia Molina 17
Quantitative molecular spectroscopy using Coulomb explosions
Zajfman, D., E.P. Kanter, T. Graber, Z. Vager and R. Naaman 22
Advanced EMR model of cluster-impact fusion
Yasui, K. and Y.H. Ohtsuki 26
The transport equation approach for the simulation of charge state fluctuation effects during ion penetration into solids
Burenkov, A.F., F.F. Komarov and S.A. Fedotov 30
The ion charge state fluctuation effect during high energy ion implantation: Monte Carlo simulation
Burenkov, A.F., F.F. Komarov and S.A. Fedotov 35
Position dependent stopping power for axially channeled 10 to 160 MeV alpha-particles in silicon
Agnihotri, R. and A.P. Pathak 39
Impact parameter dependent electronic stopping for low velocity heavy ions
Lennard, W.N., Xia Yueyuan and H. Geissel 44
Energy loss distribution of 100 keV H^+ in thin carbon films
Matsunami, N. and K. Kitoh 50
Stopping power at metal surfaces
Ohtsuki, Y.H., T. Tokioka, T. Iitaka and M. Kitagawa 53
Large hydrogen cluster stopping in carbon
Abril, I., M. Vicanek, A. Gras-Martí and N.R. Arista 56
Multiple-center effects in the stopping power of slow clusters
Barrachina, R.O., J. Calera-Rubio and A. Gras-Martí 62
Z_1 oscillations in slow channeled ion stopping power
Peñalba, M., A. Arnau and P.M. Echenique 66
Energy loss of hydrogen projectiles below the Bohr velocity in amorphous carbon
Golser, R., Ch. Eppacher and D. Semrad 69
The stopping power and the effective charge of a singly charged helium ion
Kaneko, T. 73

0168-583X/92/$05.00 © 1992 – Elsevier Science Publishers B.V. All rights reserved

Screening of ions in matter
Moneta, M., T. Kaneko and J. Czerbniak 77
Dynamic response of surface electrons to energetic ions at glancing angle scattering from crystal surfaces
Fujii, Y., K. Narumi, K. Kishine, K. Kimura and M. Mannami 82
Ionization energy in an HPGe semiconductor detector
Tong, S.Y. and W.N. Lennard 87
Pulse height response of Si surface barrier detectors to 5–70 MeV heavy ions
Comedi, D. and J. Davies 93
Enhanced depth and mass resolution with HIRBS
Yang, Q. and D.J. O'Connor 98

Section II. Projectile excitation, capture and loss

Convoy electron acceleration
Koyama, A. 103
Convoy electrons accompanying neutral ejectiles in ion–solid interactions
Kroneberger, K., G.M. Sigaud, H. Rothard, O. Heil, A. Albert, R. Maier, D. Schlösser, M. Schosnig, H. Trabold and K.O. Groeneveld 109
Production of convoy electrons by foil-excited He ions
Mannami, M., K. Kimura, Y. Susuki, M. Hasegawa, Y. Mizuno, M. Tsuji, N. Sakamoto, H. Ogawa, I. Katayama, T. Noro and H. Ikegami 114
Unique channeling experiments with cooled relativistic heavy ions
Geissel, H. 120
Computer simulations of relaxation processes in scattering of multi-charged ions from metal surfaces
Overbury, S.H., F.W. Meyer and M.T. Robinson 126
Theoretical neutralization rates for Rydberg states in ion–metal-surface scattering
Wille, U. 132
The effective charge of He ions in metals
Eppacher, Ch. and D. Semrad 138
Dynamical behaviour of angular momentum distributions of autoionizing $1s^2 2p9l$ states of S^{12+} ions excited through carbon foils
Imai, M., M. Sataka, H. Naramoto, Y. Yamazaki, K. Komaki, K. Kawatsura and Y. Kanai 142
Observation of field ionized Rydberg electrons from highly excited heavy ions after passage through foil targets
Schramm, R. and H.-D. Betz 146
Threshold for beam–foil convoy electron production
Suárez, S., V. Ponce, R. Pregliasco, P. Focke and W. Meckbach 148
Angular separation of the direction of emission of convoy peak electrons from the direction of a proton beam emerging from tilted foil targets
Focke, P., S. Suárez, R. Pregliasco and W. Meckbach 152
Auger capture rates for a slow ion close to a metal surface
Alducin, M., A. Arnau and P.M. Echenique 157
Z_2-dependence of energy spectra of electrons excited by fast heavy ions incident at grazing angle
Ishikawa, H., A. Misu, A. Koyama, T. Iitaka, M. Uda and Y. Ohtsuki 160
Convoy electrons produced at glancing angle scattering of MeV molecular ions from a single crystal surface
Mizuno, Y., M. Hasegawa, Y. Susuki, K. Kimura and M. Mannami 164
High l-state population in O^{7+} produced in ion–solid collisions
Kemmler, J., J. Burgdörfer and C.O. Reinhold 168

Section III. Channeling and dechanneling

Ion channeling in T-phase quasicrystals: an investigation by Rutherford backscattering and particle induced X-ray emission
Carstanjen, H.D., R.M. Emrick, T. Kupke, D. Plachke, R. Wittmann and H.-R. Trebin 173
Resonance dechanneling in strained-layer superlattices in the case of axial-to-planar channeling transition
Lenkeit, K. 180
Giant focusing peak and potential dependence observed in a transition from axial to planar channeling in Si
Smulders, P.J.M., A. Dygo and D.O. Boerma 185
Energy dependence of dechanneling due to dislocation loops
Gärtner, K. and A. Uguzzoni 189
Ion channeling investigations in high T_c materials
Sharma, R.P., L.E. Rehn, P.M. Baldo, J.W. Downey, B. Kestel, R. Vane, H.F. Krause and P.F. Dittner 194
Channeling study of carbon atom location in Re–C_x and Ni–C_x systems
Skakun, N.A., V.A. Olejnik, A.S. Deev, P.A. Svetashov, A.Ya. Grinchenko and N.F. Shul'ga . . 199
Channeling study of high-T_c superconducting single crystal sublattices
Skakun, N.A., A.Yu. Grinchenko, A.S. Deev, V.I. Makarov, V.A. Olejnik, P.A. Svetashov, R.P. Slabospitsky and N.F. Shul'ga 202
Stability of motion of high energy particles in crystals and random string approximation
Akhiezer, A.I., V.I. Truten' and N.F. Shul'ga 207
Spin rotation and deflection of high energy charged particles in a bent crystal due to multiple scattering by atomic strings
Greenenko, A.A. and N.F. Shul'ga 212
Computer simulation of channeling in strained-layer superlattices
Lenkeit, K. and A. Pirrwitz 217
Channeling of B ions in silicon
Vos, M., C. Wu, I.V. Mitchell and P.J.M. Smulders 223
Kinetic equation for relativistic charged particles channeling in a bent crystal
Vel'ko, A.V. 228
Thermal fluctuations in surface transmission for axial channeling
Uguzzoni, A., J.U. Andersen and V. Ryabov 231
Planar channeling dips in backscattering yield
Kennedy, E.F., B. Bech Nielsen and J.U. Andersen 236
The penetration of protons with energies of 300 to 500 keV through thin silicon crystals
Kamyshan, A.S., F.F. Komarov, M.A. Kumakhov, A.A. Liseenko and T.V. Pozdeeva 241
Computer study on energy loss and multiple scattering of channeled protons and antiprotons
Sugimura, N., H. Minowa, S. Shindo and H. Nitta 246

Section IV. Channeling radiation

Orientation effects in intensity and polarization of γ-radiation emitted by 1 GeV electrons in single crystals
Sanin, V.M., V.M. Khvastunov, V.F. Boldyshev and N.F. Shul'ga 251
Energy loss dependence of X-rays emitted by titanium ions channeled in a thin gold single crystal
Vane, C.R., P.F. Dittner, H.F. Krause, J. Gomez del Campo, N.L. Jones, P.A. Zeijlmans van Emmichoven, U. Bechthold and S. Datz 256
Semiclassical approach to the radiation theory of high energy particles in crystals and the boundary conditions problem
Akhiezer, A.I. and N.F. Shul'ga 262

Spectral–angular distributions of gamma radiation induced by GeV electrons in thick crystals
Antipenko, A.P., S.V. Blazhevich, G.L. Bochek, S.P. Fomin, V.I. Kasilov, V.I. Kulibaba, N.I. Maslov, N.N. Nasonov, N.I. Lapin, V.D. Ovchinnik, B.I. Shramenko and N.F. Shul'ga 267
Monte Carlo study of interactions of high energy electrons and photons in Ge and Si crystals
Rzepka, M., E. Diedrich and G. Buschhorn 271
Channeling radiation from 72 MeV electrons in silicon: transition from planar to axial channeling
Diedrich, E., G. Buschhorn, W. Kufner, M. Rzepka, H. Genz, P. Hoffmann, U. Nething and A. Richter 275

Section V. Surface phenomena (growth, modification, scattering)

Surface radiation damage
Armour, D.G. and A.H. Al-Bayati 279
Atomic collisions in surface chemistry and film deposition
Rabalais, J.W. and D. Marton 287
Molecular dynamics simulations of low-energy cluster deposition on metallic targets
Pelletier, J.D., M.H. Shapiro and T.A. Tombrello 296
Kinetics of ion beam nitridation (IBN) of Si and MBE-grown Ge and Si_xGe_{1-x} alloys: the role of ion energy, ion dose and substrate temperature
Hellman, O.C., N. Herbots and O. Vancauwenberghe 301
Defect formation in graphite during low energy Ne^+ bombardment
Steffen, H.J., D. Marton and J.W. Rabalais 308
Point defect formation on graphite surface induced by ion impact at energies near penetration threshold
Kang, H., K.H. Park, C. Kim, B.S. Shim, S. Kim and D.W. Moon 312
Stochastic effect in grazing ion surface scattering
Kato, M., T. Kurose, N. Inoue, T. Hasegawa and K. Matsuzawa 316
Study of the trajectory effect in grazing ion surface scattering
Kurose, T., M. Kato, N. Inoue, T. Hasegawa and K. Matsuzawa 320
Momentum distribution of charged light particles after grazing scattering from metal surfaces
Kato, M. and A. Ishii 324
Ion scattering studies of the structure of the Ir(110) surface
Höfner, C., W. Hetterich, H. Niehus and W. Heiland 328
Computer simulation of CAICISS of AlAs(001)
Chakarov, I., B.V. King, R.P. Webb and R. Smith 332
A semi-empirical many-body interatomic potential for modelling dynamical processes in gallium arsenide
Smith, R. 335
An ISS study of thin metallic layers evaporated on gold substrate: experimentation versus simulation
Beuken, J.-M. and P. Bertrand 340
Coulomb explosion of fast H_2^+ molecular ions in grazing collisions with a Si(111) surface
Winter, H., J.C. Poizat and J. Remillieux 345
Oxygen adsorption and oxide growth on Ni_3Al single crystal surfaces
Shen, Yaogen, D.J. O'Connor and R.J. MacDonald 350
Observation of skipping motion
Pfandzelter, R. and F. Stölzle 355
The broadening of energy spectra of atoms scattered by a solid surface under molecular bombardment
Bitensky, I.S., E.S. Parilis and I.A. Wojciechowski 359

Section VI. Collision cascades, radiation damage and ranges

Relevance of atomic collisions in low-dimensional structure physics
Elliman, R.G. 365
Computational models in atomic collision studies
Smith, R. and R.P. Webb 373
Transient charge collection from ion tracks in semiconductors
McMorrow, D., A.B. Campbell, A.R. Knudson, S. Buchner and T.R. Weatherford 384
Electron microscopy observations of titanium irradiated with GeV heavy ions
Henry, J., A. Barbu, B. Leridon, D. Lesueur and A. Dunlop 390
Computer simulation studies of high-energy collision cascades
Robinson, M.T. 396
An efficient combination of the binary collision approximation with classical dynamics for stable low energy radiation damage calculations
Hou, M. and Z. Pan 401
A study of disordered regions in neutron irradiated Si
Wu, F., Y. Shi and D. Shen 406
Effect of sputter voltage on the electrical characteristics of argon ion sputtered n-type GaAs
Auret, F.D., G. Myburg, S.A. Goodman, L.J. Bredell and W.O. Barnard 410
A nuclear reaction analysis study of boron implanted at low energy into silicon
Valizadeh, R. and G. Farrell 415
Partial wave expansion of ion–atom elastic scattering in solids
Ohya, K., J. Kawata and I. Mori 419
Isotope effect on ion ranges
Vicanek, M., A. Gras-Martí and H.M. Urbassek 423
A first study of radiation damage due to oxygen implantation in $CuInSe_2$ single crystals
Crowther, V.P., M. Imanieh, G.A. Stephens and R.D. Tomlinson 428
Ion beam modification of polymers
Sofield, C.J., S. Sugden, C.J. Bedell, P.R. Graves and L.B. Bridwell 432

Section VII. Ion implantation, annealing and mixing

Diffusion of group III-, IV- and V-elements in Si under ion irradiation
Krause, P., H. Kerkow, K. Holldack and R. Wedell 439
Particle reflection and re-implantation during grazing incidence implantation of As^+ and B^+ into silicon
Posselt, M., L. Drechsler, R. Grötzschel, R. Klabes, G. Otto, A. Schöneich, E. Sobeslavsky and H. Syhre 443
The role of fractofusion in the creation of anomalies in neutron production from deuterium-implanted solids
McKee, J.S.C., G.R. Smith, J.J.G. Durocher, H.L. Johnston, M.S. Mathur, J.K. Mayer, A. Mirzai, Y.H. Yeo, A. Hempel, H. Hnatiuk, S. King, K.S. Sharma and G. Williams 448
Radiation enhanced adhesion by MeV ions
Sugden, S., C.J. Sofield and M.P. Murrell 452
A study of enhanced diffusion during high dose high flux pulsed metal ion implantation into steel and aluminium
Zhang Tonghe, Ji Chengzhou, Shen Jinghua and Chen Jun 458
The behavior of high energy multiple P^+ (0.5–7.5 MeV) and B^+ implanted silicon and rapid thermal annealing
Wu Yuguang, Zhang Tonghe, Luo Yan and Sun Guiru 464
Amorphous–crystal boundary motion and impurity redistribution during keV Ne^+ ion irradiation of Si
Sukirno, B. Zeroual, G. Carter and G.A. Stephens 470

MeV P implants in silicon: experiments and simulation
Galvagno, G., V. Raineri, R. Setola, F. Priolo and E. Rimini 476
Effects of high dose fluorine implantation into silicon
Wong, S.P., I.H. Wilson, W.Y. Cheung, W.K. Mok and S.K. Hark 481
The effect of parameter choice on predicted depth resolution in sputter profiling
Carter, G., M.J. Nobes, I.V. Katardjiev, J.J. Jiménez-Rodríguez, I. Abril and A. Gras-Martí . . 486
Interface width dependence on sample temperature during Auger sputter depth profiling of Cr/Ni multilayered thin films
Tanović, N., L. Tanović and J. Fine 491
On some factors limiting depth resolution during SIMS profiling
Zalm, P.C. and C.J. Vriezema 495
Ion beam induced mixing in Pd thin films on silicon
Bibić, N., M. Milosavljević, D. Peruško, Y. Serruys and C. Jeynes 500
Calculation of the ballistic relocation cross-sections
Jiménez-Rodríguez, J.J., A.M.C. Pérez-Martín and J.A. Peinador 504

Section VIII. Sputtering and desorption

Theory of ion desorption spectroscopy stimulated by positronium formation at a solid surface
Ishii, A. 509
Influence of surface topography on the sputtering yields of silver
Pan Jisheng, Wang Zhenxia, Tao Zhenlan and Zhang Jiping 514
Internal and translational energy of sputtered silver dimers: a molecular dynamics study
Wucher, A. and B.J. Garrison 518
Sputtering of graphite by argon ions
Fayazov, I.M., E.S. Mashkova, V.A. Molchanov, A.V. Sidorov, A.I. Tolmachev and W. Eckstein 523
Fluence dependent mixing of isotopic targets: a theoretical case study
Jiménez-Rodríguez, J.J., U. Conrad, H.M. Urbassek, I. Abril and A. Gras-Martí 527
Energy dependent studies of anisotropic atomic sputtering of Ni(111)
Wucher, A., M. Watgen, C. Mößner, H. Oechsner and B.J. Garrison 531
Re-emission of deuterium from pure and boronized graphite
Franzen, P., B.M.U. Scherzer and W. Möller 536
Angular distribution of particles sputtered from nickel single- and polycrystalline targets in the vicinity of the Curie point
Shakirov, R., L. Shelyakin, V. Yurasova and Yu. Kuzmin 540
Molecular and cluster ions produced from frozen C_2H_2 molecules under energetic, heavy ion impact
Tonuma, T., H. Kumagai, T. Matsuo, H. Shibata and H. Tawara 544
Enhanced sputtering of solid neon by molecular ions
Ellegaard, O., J. Schou, B. Stenum, H. Sørensen and R. Pedrys 549
Ion formation on the surfaces of electrodes
Schwirzke, F., M.P. Hallal Jr and X.K. Maruyama 554
Beam induced sputtering of chromium–iron based alloy
Nenadovic, T.M., R.D. Simovic and T.Lj. Jokic 560
Atomic excitations in ion induced sputtering of a Rh(100) single crystal
Postawa, Z., M. El-Maazawi, R. Maboudian and N. Winograd 565
Sputtering by MeV ions
Sugden, S., C.J. Sofield and M.P. Murrell 569
Note on the spectra of excited particles in sputtering from collision cascades
Konoplev, V.M., M. Vicanek and A. Gras-Martí 574

Determination of the mean velocity for sputtered particles from amorphous and crystalline solids
Fielitz, P., H. Kerkow and R. Wedell 580
A cellular automata simulation study of surface roughening resulting from multi-atom etch pit generation during sputtering
Toh, Y.S., M.J. Nobes and G. Carter 586
Microtopography and interface width of sputter profiled Cr/Ni multilayered thin-film materials
Tanović, N., L. Tanović, J. Fine, B. Gaković, P. Panjan and N. Popović 590
Push-and-stick mechanism for charged and excited small cluster emission under ion bombardment
Bitensky, I.S., E.S. Parilis and I.A. Wojciechowski 595

Section IX. Secondary emission and optical radiation

Incident angle dependence of secondary electron emission from a Ta surface by multiply charged ions
Kanie, T., A. Ichimiya, S. Ohtani, H. Tawara and T. Yasue 601
Optical emissions from sputtering species formed by the fast ion bombardment of clean and oxygenated Mg surfaces
Fournier, P.G., J. Fournier and B. Bellaoui 604
Ion-induced Auger emission and sputtering processes in solids
Maydell, E.A. and D.J. Fabian 610
Light emission from thin carbon foils bombarded with medium velocity heavy ions
Kobayashi, H., N. Oda, F. Nishimura, J.S. Park and T. Ichimori 616
Light emission from sputtered atoms following ion bombardment of polycrystalline metal targets
Reinke, S. and R. Hippler 620
Ion–photon emission of Cu–Zn alloy
Bazhin, A.I., R.K. Nafeev, A.M. Panesh, M. Suchańska and V.P. Shestov 624
Statistics of kinetic secondary electron emission due to ion–atom collisions in solids
Ohya, K. and I. Mori 628
Surface electron emission induced by ion bombardment: methods of observation
Soszka, M. and W. Soszka 632
Secondary electron emission from a C-foil resulting from the passage of orientation selected He_2^+ molecular ions
Azuma, T., Y. Yamazaki, K. Komaki, M. Sekiguchi, T. Hasegawa, T. Hattori and K. Kuroki . . 636
Contribution of core states to the emission properties in the particle-induced electron emission of metals
Rösler, M. and W. Brauer 641
Study of the influence of the electron capture and loss process on the secondary electron emission induced by protons in aluminium
Smidts, C., A. Dubus, J.C. Dehaes, A. Hafni and J.P. Ganachaud 646
Approximate solution of the Boltzmann electron transport equation in a semi-infinite medium and surface correction to the secondary electron yield
Devooght, J., A. Dubus and J.C. Dehaes 650
Secondary electron emission from metal surfaces by ion impact
Kaneko, T. 655
Surface and residual-hole effects in electron emission from solids
Gervasoni, J.L., N.R. Arista, R.O. Barrachina and A. Gras-Martí 659

Author index 665